

COMMENTS ON COOK'S THEORY AS TO THE AMERICAN
ORIGIN AND PREHISTORIC POLYNESIAN DISTRI-
BUTION OF CERTAIN ECONOMIC PLANTS, ESPE-
CIALLY HIBISCUS TILIACEUS LINNAEUS

By ELMER D. MERRILL

Director and Botanist, Bureau of Science, Manila

Mr. O. F. Cook, of the United States Department of Agriculture, has given considerable attention to the theory of the American origin and the prehistoric distribution across Polynesia of various economic plant species, and has published several papers on the subject. In this series of papers there is considerable evidence that their author is inclined to draw conclusions from insufficient data, involving a lack of personal knowledge of the several species as they occur in nature in various parts of the world, especially in the Old World. It would seem also that, accepting the theory of American origin for a particular species, he is prone to discuss the data in support of that theory, subordinating or overlooking facts that are contrary to the general thesis. The result is that the arguments as presented and the conclusions derived therefrom are not always conclusive, and are certainly not always convincing from either a botanical or a philological standpoint.

He has attempted to prove the American origin of the coconut (*Cocos nucifera* Linn.), and its transmission by the Polynesians across Polynesia to Malaya and tropical Asia in prehistoric times,¹ but more convincing to me are the arguments of Dr. O. Beccari² that it is a native of Polynesia or tropical Asia, and that it is a halophilous plant, which may have been disseminated in part by ocean currents.

Beccari, among other criticisms of Cook's arguments, has shown that the palm does occur wild in nature, as witnessed by its unaided development on the isolated and uninhabited Palmyra

¹ The origin and distribution of the cocoa palm, Contr. U. S. Nat. Herb. 7 (1901) 257-293; History of the coconut palm in America, Contr. U. S. Nat. Herb. 14 (1910) 271-342.

² Beccari, O., The origin and dispersal of *Cocos nucifera*, Philip. Journ. Sci. 12 (1917) Bot. 27-43.

Islands, and that it can compete successfully with the arborescent vegetation of tropical strand floras. He has called attention to the fallacy of the statement that Cook makes regarding the plant as seldom growing on the immediate strand, a statement certainly made without sufficient knowledge of the species as it grows in nature; for, as Beccari indicates, the immediate strand is the habitat par excellence for this palm in the vast Indo-Malayan-Polynesian region, as is witnessed by tens of thousands of miles of palm-lined shores in the Philippines and in the Tropics of the Old World as a whole. Again in support of his general thesis that the coconut was not disseminated by ocean currents, Cook illogically argues that the chances are hundreds to one that coconuts falling into the water will be thrown back immediately upon their own coast like other objects floating in the surf, and further that: "High waves or tides, instead of floating shore débris away, merely carry it farther inland, as everybody familiar with seacoasts knows." If this be always true, as Beccari notes, we should have to evolve some other theory to explain the geographic distribution of the characteristic elements of the strand floras of the world. The revegetation of Krakatao, so far as its present strand flora is concerned, is in direct opposition to the idea that shore débris is *always* carried farther inland by the waves as Cook infers.

Messrs. O. F. and R. C. Cook³ have recently made the claim that *Hibiscus tiliaceus* Linn. appears to have been distributed over the islands and shores of the Pacific and Indian Oceans before the arrival of Europeans—a claim that no botanist familiar with the geographic distribution of this characteristic species will dispute. When, however, they infer that the primitive Polynesians were in possession of this species before they became acquainted with similar Asiatic plants; that it may have been carried by them from America across the tropical regions of the Old World; and that, therefore, it is one of the economic plants to be taken into consideration in studying the problem of contacts between the inhabitants of tropical America and Polynesia in prehistoric times, it would seem advisable to present the data in opposition to this argument.

With their first contention, "The maho [*Hibiscus tiliaceus* Linn.] * * * appears to have attained a trans-Pacific distribution in prehistoric times," no fault can be found, as the species is one having a true, and certainly natural, pantropic

³ Cook, O. F., and Cook, R. C., The maho, or mahagua, as a trans-Pacific plant, Journ. Wash. Acad. Sci. 8 (1918) 153-170.

distribution. We later read: "As with the coconut palm and the sweet potato, the *maho* figures more prominently among the Polynesians than among the natives of tropical America, although the American origin of the plant is *even more clearly indicated*" [italics mine]. The paragraph headings "A wild plant in America" and "A cultivated plant in the Old World" emphasize the fact that the authors are unacquainted with the plant as it occurs in the Old World. All botanists familiar with this common species as it occurs in the vast Indo-Malayan region will at once realize that the last paragraph heading is exceedingly misleading.

They concede that the plant is wild and of wide distribution in tropical America, a region with which they are familiar, where it grows naturally along the seashore; but they make the most curious general claim that it is a cultivated plant in the Tropics of the Old World, a region they have apparently never visited. They admit that in some Polynesian islands it grows spontaneously and covers large areas that have been abandoned after previous cultivation, and that low banks of tidal rivers are its favorite habitat. They do not, however, accept the statements made by numerous botanists, many of whom were familiar with the plant in its native habitat in the Old World, that it is a pantropic strand plant. Their theory regarding *Hibiscus tiliaceus* is apparently based largely on the fact that they know the species from personal observation to be a native strand plant in tropical America, plus the statement in various published works that it is cultivated in Polynesia, and the assumption that it is also cultivated in other parts of the Old World Tropics. This being so, they could then reason its transmission by man from the New to the Old World, and interpret various data in support of that hypothesis.

As a matter of fact, outside of Polynesia the species is never cultivated in the Tropics of the Old World, although one occasionally finds individual trees planted inland for ornamental purposes, while on the islands of the Pacific its cultivation is by no means universal; for here, as elsewhere, it is of wide natural distribution along the seashore, and on many islands (Guam for example) it occurs in enormous quantities forming gregarious thickets near the sea. In tropical Asia and Malaya the plant is not of sufficiently great economic importance to warrant its cultivation, and in these vast regions it is certainly not a species that has purposely been disseminated by man, in either prehistoric or historic times. On some Pacific islands it occurs

gregariously inland, where it sometimes almost exclusively occupies considerable areas, as I have personally observed in Hawaii. The reasons for its cultivation on some Polynesian islands were undoubtedly that it was the best, or one of the best, of the few fiber plants available to the primitive Polynesians, and that the number of plants growing naturally along the strand was not sufficient to supply the demands for fibers for all purposes. *Hibiscus tiliaceus* was never domesticated or even semi-domesticated in tropical America and in the Indo-Malayan region, for the reason that plants producing better fibers were available in both regions.

I maintain on purely botanical evidence that *Hibiscus tiliaceus* is a species of natural pantropic distribution; that it grows in practically all tropical countries along the seashore, its natural habitat; and that it has been disseminated in ages past by ocean currents. Its seeds are beautifully adapted to dissemination by floating for, although small, they are provided with a smooth impervious testa, and float for many months without sinking. In fact, no one has as yet recorded his ability to cause them to sink naturally, investigators being satisfied from experimentation with the statement that they "float for months."

Even in Polynesia it is exceedingly doubtful if the Polynesians transmitted this species from island to island, it being far more probable that they purposely propagated it inland from the native seacoast stock on the various islands. From personal experience over a period of more than eighteen years I am familiar with the entire Philippine group from northern Luzon to southern Mindanao, and have observed that throughout these islands *Hibiscus tiliaceus* is a characteristic species of the seashore, often being the dominant, or one of the dominant, species on the strand; it occurs not only on beaches contiguous to thickly settled areas but also on isolated and sparsely populated coasts, and on uninhabited islands and islets. From what I know of the Indo-Malayan region generally I am confident that the species occurs similarly on the tens of thousands of miles of coast line throughout tropical Asia, Africa, Malaya, tropical Australia, and many islands of the Pacific, as I have personally observed it in the Philippines and in the Marianne Islands. There can scarcely be any arguments as to other than its natural pantropic distribution, and claims to the contrary would appear to be not in conformity with the known facts regarding its occurrence and distribution in nature.

Being thoroughly familiar with *Hibiscus tiliaceus* as it occurs in nature in the Old World, it is difficult for me to conceive how any botanist could seriously advance the argument that it is a native of tropical America transmitted to the Old World by the primitive Polynesians and, as a corollary, attempt to prove intercommunication between Polynesia and tropical America in prehistoric times on the basis of the present pantropic distribution of this species. That a limited intercommunication between Polynesia and tropical America did exist in prehistoric times is entirely probable, but to argue that the present distribution of *Hibiscus tiliaceus* supports this theory certainly does not strengthen the probability.

The generally accepted theory among ethnologists supports an *eastward* culture movement across the Pacific rather than a *westward* one. If the Cook *maho* series is related to the Polynesian *mao* series it would be much more reasonable to view it as coming from the Pacific to America rather than as evidencing a migration from America into the Pacific. If, as they claim, the American origin of *Hibiscus tiliaceus* is *even more clearly indicated* than is the similar origin of the coconut and the sweet potato, the claims to the American origin of the last two must be very weak indeed.

Their argument regarding the origin and distribution of *Hibiscus tiliaceus* is largely based on the similarity between its local names in tropical America and in Polynesia; namely, *maho*, *mahagua*, etc., in tropical America, and *mao*, *mau*, *vau*, etc., in Polynesia. About thirteen pages are devoted to a discussion of the philological questions involved. While many data are given to show the similarity of names in tropical America and Polynesia, it is stated that the names used in Fiji, Guam, and the Philippines may not belong to the *maho* series. The large number of Malay Archipelago names is ignored, but the statement is made that local names used in Madagascar and the neighboring islands appear to connect with the Malay and Polynesian series.

The recorded names for the species in the Philippines are *bago*, *bauan*, *balobago*, *balibago*, *malabago*, *malabagu*, *malambago*, *mayambago*, *mulabago*, *danglog*, *loago*, *hanot*, and *hanut*; of these *balibago* and *malabago* are the ones most commonly and widely used. The recorded names for the Malay Archipelago, not mentioned by Cook, are *balebirang*, *baoe*, *baeok*, *baroe*, *baroe bhender*, *hae ai*, *haroe*, *kabaroe*, *kalimbaoean*, *kasjanaf*, *kawaoean*, *kelambaoean*, *kioko*, *lago*, *molombagoe*, *molowahoe*, *papatpat*, *pohon baeok*, *siroen*, *wahoe*, *wande*, *waoe*, *waroe*, *waroe*

laoet (*laoet*=ocean), *waroe lenga*, and *waroe lengis*. These names are from Dutch sources, and it should be borne in mind that in Dutch orthography *oe* represents the sound *u*.

As noted above, the authors state that it may be doubted whether names like *vahu*, *balibago*, and *pago*, used in Fiji, the Philippine Islands, and Guam, belong in the *maho* series, but consider that the relation seems possible in view of the intermediate Polynesian forms like *bago*, *faga*, and *haga*. They do not discuss the Malayan names enumerated above, but with the statement that they appear to connect with the Malayan and Polynesian series they list the following names from Madagascar and neighboring islands: *baro*, *var*, *varo*, *vau*, and *vaur*. Among the names in use in India, *bariá* and *baru* are suggestively like many of the Malayan, Mascarene, and Polynesian names.

Not being qualified personally to discuss the philological questions involved, and yet confident on purely botanical grounds that *Hibiscus tiliaceus* is a strand plant of natural pantropic distribution, at my request Prof. H. Otley Beyer, of the department of anthropology, University of the Philippines, and Mr. E. E. Schneider, of the Philippine Bureau of Forestry, have examined Cook's paper and my notes on which this article is based. Both of these men are authorities on Philippine languages and both are deeply interested in the comparative philology of Indo-Malayan, Philippine, and Polynesian languages. Professor Beyer, whom I first consulted, has called my attention to the fact that the Polynesian *mao* series may well have been derived from some of the Malayan forms by the suppression of consonants, which is a fundamental characteristic of the Polynesian group of languages as contrasted with the Malayan languages. It seems to me to be entirely probable that the original form or root in the Indo-Malayan region was some word like *bago* or *baru*. It is to be noted that with the substitution of *m*, *f*, and *v* for the initial *b*, and *h* for *g* or *r*, or the suppression of the latter two letters, we have a series of names that approximate the Polynesian *mao* series given by Cook as *mao*, *mau*, *au*, *hau*, *fau*, and *vau*. The probabilities are very great that all of the Polynesian *mao* series are merely modifications of the Indo-Malayan *bago* series; and that the Polynesians in their migration, having adopted the name while in the Indo-Malayan region, merely applied it to the wild plant which they found all over Polynesia. It would seem, therefore, that this root has nothing to do with the tropical American *maho* series, the resemblances being merely accidental. The *bago* origin of the *mao*

series is a great deal more likely than the *maho* origin, and infinitely more probable in view of the generally accepted theories as to the origin and migrations of the Polynesians. It is, moreover, not, as these authors contend, in violent opposition to the known distribution and occurrence in nature of the species under discussion.

Mr. Schneider is in full agreement with the *bago* or *baru* origin of the Polynesian *mao* series. He considers that one of the weakest spots in Cook's argument is the expressed doubt that the Fijian *vahu*, the Philippine *balibago*, and the Guam *pago* belong to the *mao* series. He states that the very wide distribution of the *bago* form in the Indo-Malayan region indicates that it is as near as we can get to the original root, whatever that may be. The fact that *r*, *g*, and *h* are interchangeable in certain series of words in most of the Indo-Malayan languages is as well established as is any of Grimm's laws in the European languages. He considers that there can be hardly any doubt that the Indian *baru* is identical with the Philippine *bago*. The final disappearance of the *h* when intervocalic is not uncommon in Tagalog and in other Philippine languages. Guam *p* for Philippine *b* is perfectly regular, as is *v*. Finally, the weakening of initial *b* to *m* is very common—for example, the plant names *banaba*, *manaba*; *binunga*, *minunga*; *batavia*, *matavia*; and, as to *malabago* itself, this is apparently nothing but a reduplicated form with weakened initial *b*, of which other examples are to be found, such as *matobato*.

As to the meaning and application of the name *maho*, Mr. Schneider further points out that, whether it was originally the name of some bast-producing plant that was also applied to others that either produced bast or resembled them in external appearance, or a word primarily meaning "bast" and "to tie," is perhaps a question which cannot be decided and, moreover, is of no great importance. The wide distribution of the word has nothing to do with this, however, the following notes indicating what seems to him to be a more probable alternative, namely, that "bast" is the original meaning of the word *maho*. *Bago*, to use now a Philippine name, is one of the most commonly used names for *Gnetum gnemon*, the bast of which is probably the strongest found in the Philippines and used wherever very strong cordage is desired. *Salago*, in which the same root occurs, is widely used for species of *Wikstroemia* and *Phaleria*, both producing a very fine and extremely tough bast. A parallel case is that of the other name, *hanot*, cited above for *Hibiscus*

tiliaceus; this, in very numerous forms, of which *banot*, *bonot*, *lanot*, *lanutan*, *wanoet* (Dutch spelling), *lapnot*, and *lapnit* are a few, is applied to even more numerous species of plants than is *bago*, but also invariably to plants producing some kind of bast fiber or tying material. Examples from widely different plants to which these names are applied are species of *Annonaceae*; representatives of *Malvaceae*; various species of vines, representing diverse families, which may either be used whole or which produce bast (*Bauhinia cumingiana*); palms having a network of fibers about the bast of leaf stalks; coir; the epidermal layers from the leaf sheaths of abacá (*Musa textilis*); and finally rattans. Mr. Schneider considers that these cases seem to indicate the derivation of the plant names from a common property rather than the derivation of names of various plants from a primitive or original name of a single species. Is not the American bass wood (bast-wood!) a perfectly analogous case?

It would seem that the argument of these authors as to the American origin of *Hibiscus tiliaceus* and its prehistoric distribution across Polynesia by the Polynesians to the Tropics of the Old World was based on erroneous assumptions on their part, from both a botanical and a philological standpoint, and that their deductions are not borne out by the facts in the case.